

**REMARKS**

Claims 1-32 are pending in the present application. In the Office Action mailed October 10, 2006, the Examiner rejected claims 1-5, 7, 9, and 17 under 35 U.S.C. §103(a) as being unpatentable over Emeric et al. (US Pub. 2002/0148604) in view of Gamble et al. (USP 5,848,532) in further view of Lee (USP 6,626,004). The Examiner next rejected claims 10, 11, and 15-16 under 35 U.S.C. §103(a) as being unpatentable over Gamble et al. in view of Lee in further view of Chen (USP 5,782,095). Claim 18 is rejected under 35 U.S.C. §103(a) as being unpatentable over Emeric et al. in view of Gamble et al. in view of Lee in further view of Chen. Claims 26, 28, 31, and 32 are rejected under 35 U.S.C. §103(a) as being unpatentable over Gamble et al. in view of Lee.

Claims 1-9 are objected to by the Examiner because of informalities. Applicant has amended claims 1 and 8, and believes the “informalities” to be fully addressed.

Claims 6, 8, 12-14, 19, 20-25, 27, 29, and 30 were indicated as containing allowable subject matter. Such indication is appreciated.

Applicant has added new dependent claims 33-36.

Regarding the substantive §103 rejection, claim 1 calls for, in part, “a recondensing system configured to cool the superconducting magnet” of an MR system having “at least one heating element configured to melt iced particles from the recondensing system.” In rejecting claim 1, the Examiner stated that paragraphs 0012-0017 of Emeric et al. teach a “heat exchanger configured to cool the superconducting magnet” of an MR device and that Gamble et al. teaches “a heating element 25 configured next to the recondenser 12 [that is] capable of melting iced particles on the heat exchangers (sic) surface.” *Office Action*, 10/10/2006, pgs. 2-3. The Examiner conceded that Gamble et al. does not “explicitly teach [that] the heater provides sufficient heat to melt iced particles,” but asserted that it would be obvious to one skilled in the art “to modify the cooling system of Gamble et al. with the heating element of Lee to advantageously melt iced particles from the surface of the recondenser and ensure excessive buildup of ice on the recondenser does not occur.” *Office Action*, 10/10/2006, pg. 3. Applicant respectfully disagrees because the references, taken as a whole, do not teach or suggest all the elements of claim 1, and further, because the references actually teach away from such a combination.

Emeric et al. regards a vacuum cooling system for a gradient coil assembly, not a “recondensing system configured to cool [a] superconducting magnet,” as claimed. Emeric mentions that “[t]he MRI device 10 includes a cryogenic tank 71 to house the main magnet,” but does not actually describe the tank 71 or disclose any recondensor therefore. *Emeric*, ¶ 0028.

Also, neither Gamble et al. nor Lee teach or suggest a recondensor specifically configured to cool a main magnet of an MRI apparatus. For this reason alone, the rejection should be withdrawn. MPEP § 2143.03 (though references should not be attacked individually, “all the claim limitations must be taught or suggested by the prior art”).

In addition, with all due respect, the Examiner’s characterization of Gamble et al. is somewhat imprecise. Gamble et al. teaches a heating element 25 in a cryocooler 13 which prevents the refrigerant fluid from freezing. *Gamble et al.*, Col. 3, lns. 55-58. In other words, the heating element 25 of Gamble et al. is configured to help regulate the temperature of the coolant fluid from getting too cold. The heating element is not positioned or configured to melt iced particles from a recondensor. *See Gamble et al.*, Fig. 1 (heating element 25 depicted in the center of heat exchanger 12 of cryocooler 13). Therefore, the Examiner’s assertions that the “heating element 25 [is] configured **next to** the recondenser 12” and that the heating element 25 is “capable of melting iced particles **on the heat exchangers surface**” are not supported by the reference itself. *Office Action*, 10/10/06, pg. 3 (emphasis added).

The Examiner attempted to rely upon the teachings of Lee regarding the defroster heater 34 for supporting modification of Gamble et al. However, the defroster heater 34 of Lee is merely a heating coil that is positioned externally of a temperature regulation system (a refrigerator) to prevent frost buildup from an **evaporator** 32. *Lee*, Col. 3, lns. 28-31. Such is not what Applicant claims as the invention herein. An evaporator is a heat diffusion element which is specifically configured to draw heat to a condensed fluid to evaporate the fluid to a gas. *Lee*, Col. 3, lns. 22-24. Applying a heater 34 to an evaporator outside the temperature regulated system does not disadvantage the system. Therefore, since 1) an evaporator is configured to do the opposite of a recondensor, 2) the heater element of Lee is working in cooperation with the function of the evaporator and opposite to the function of a recondensor, and 3) the heater element of Lee is external to the temperature regulated system, one skilled in the art would not be motivated from the teachings of Lee to modify the device of Gamble et al. to incorporate such a device into an MRI main magnet cooling system.

In short, the Examiner has not shown that all elements of claim 1 are taught or suggested by the art of record, and one skilled in the art would not be motivated to modify the references as proposed by the Examiner. Accordingly, Applicant respectfully requests withdrawal of the rejection of claim 1 and all claims depending therefrom.

The Examiner next rejected claim 10 as being obvious in light of Gamble et al., Lee, and Chen. Claim 10 calls for “a superconducting magnet immersed in a bath of liquid coolant” and “at least one resistive element configured to selectively deliver a supply of heat to at least one of

the recondensor, the supply tube, and the delivery tube to melt ice particles.” The Examiner cited Gamble et al. as teaching a heater configured to deliver heat to a recondensor, Lee as teaching a defroster for an evaporator, and Chen as teaching a supply tube and a delivery tube connected to a recondensor of an MR cooling system. *Office Action*, 10/10/06, pg. 5. Applicant believes that the references are not combinable in such a manner, and further, do not teach all elements of claim 10.

First, the system of Gamble et al. is designed for cooling a motor or other load that is external from the fluid reservoirs 18, 20. That is, the device being cooled (load 14) is not in a bath of liquid coolant. Gamble et al. not only teaches, but also claims, a system wherein the coolant itself is **circulated** in two modes of operation – from one reservoir, over the motor, to another reservoir and then back over the motor to the first reservoir. *Gamble et al.*, Col. 4, lns. 26-67 (describing pressurized circulation of liquid from heat exchanger 12 through reservoirs 18, 20 to load 14). Thus, it is unclear how the Examiner proposes to incorporate the system of Gamble et al. into the system of Chen (using an uncirculated pool of liquid coolant) without modifying the system of Gamble et al. to become unsuitable for its intended purpose. *See* MPEP § 2143.01 (“the proposed modification cannot render the prior art unsatisfactory for its intended purpose”).

Additionally, the heater 25 of Gamble et al. directly regulates the temperature of liquid coolant inside a heat exchanger 12, within the closed cooling system, but does not melt ice particles forming thereon. *Gamble et al.*, Col. 3, lns. 55-58. The defroster 34 of Lee heats coils of an evaporator 32 in the atmosphere. Heating an evaporator coil (which warms a fluid) does not suggest the desirability of heating a recondensor (which cools a fluid). The Examiner has not identified any teaching or suggestion in the art of a heater configured to heat a recondensor itself. Therefore, Applicant believes that there is no motivation to combine the art of record and that the art of record does not teach all the elements of claim 10. Accordingly, Applicant respectfully requests withdrawal of the rejection of claim 10 and all claims depending therefrom.

The Examiner rejected claim 17 as being obvious in light of Emeric et al., Gamble et al., and Lee. Claim 17 calls for, in part, “a sealed chamber forming a cooling jacket configured to pool coolant around the superconducting magnet” and “at least one heating component configured to de-ice the recondensor.” As discussed above with respect to claim 1, Emeric et al. does not specifically teach or suggest any details regarding the cryogenic tank 71 thereof. Furthermore, Applicant has shown above that an element configured to heat components of a recondensor of an MR magnet cooling system “to melt ice particles” is not obvious from the

teachings of Gamble et al. and Lee. Accordingly, Applicant respectfully requests withdrawal of the rejection of claim 17 and all claims depending therefrom.

Claim 26 is “[a] method of non-invasive de-icing of a recondensor system of a superconducting MR magnet assembly” that includes a step of “vacuumously removing melted ice deposits.” In rejecting claim 26, the Examiner noted that Gamble et al. teaches “vacuum insulated lines 16 used as a cooling loop,” but that Gamble et al. does not teach that “the vacuum supply is configured to remove the melted ice deposits.” *Office Action*, 10/10/06, pg. 8. The fact that fluid conduit lines 16 of Gamble et al. are vacuum insulated does not teach or suggest that they can vacuumously operate to remove some non-disclosed ice deposits thereof. Therefore, the Examiner, in effect, never cited any reference for removing melted ice deposits as by a vacuum. Instead, the Examiner merely stated that “it is inherent that as ice melts, gas particles will be released will be released (sic) to the atmosphere.” *Office Action*, 10/10/06, pg. 9. However, releasing gas particles **into the atmosphere** (as may presumably occur with the defroster 34 of Lee) has nothing to do with **vacuum** removal thereof. In other words, the Examiner conceded that the art of record does not teach vacuum removal of melted ice deposits but did not cite any reference that does teach vacuum removal of melted ice deposits. Such a rejection is, on its face, unsustainable. Applicant therefore respectfully requests withdrawal of the rejection of claim 26 and all claims depending therefrom.

Therefore, in light of at least the foregoing, Applicant respectfully believes that the present application is in condition for allowance. As a result, Applicant respectfully requests timely issuance of a Notice of Allowance for claims 1-36.

Applicant hereby authorizes charging of Deposit Account No. 07-0845 for any additional fees associated with entering the aforementioned claims.

Applicant appreciates the Examiner’s consideration of these Amendments and Remarks and cordially invites the Examiner to call the undersigned, should the Examiner consider any matters unresolved.

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